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ABSTRACT

The concept of sustainable economics not only examines how to produce what for whom but also how irreplaceable resources can be adequately conserved. Efficient and equitable economic mechanisms are central components of the concept. Analyzing issues complicated by politics, ideology, and nationalism, sustainable economics scholars attempt to explore what works to make resource use more efficient, how people behave in relation to resources, and how a country's economic system can alter its prospects for survival. In this paper an answer for survival is sought through an examination of the performance of various countries throughout the world in agricultural efficiency/food security, energy efficiency, environmental pollution, and equity. Central to these topics is the changing reliance on the market, which should have significant human and environmental consequences. It is also contended that efficient food production and energy consumption make the best indicators of progress toward sustainable economics. It is concluded that many countries are reorienting their economies but that over-optimism about efficiency is not justified in view of the many problems that remain. Ten tables and 4 figures illustrate the topics in question. (TRS)

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"All happy families resemble one another, each unhappy family is unhappy in its own way," wrote Tolstoy in *Anna Karenina*. He could have been describing the world's economic families. Happy economic choices generally satisfy some common principles, though misery can have many origins.[1]

Economic science asks *how* to produce *what* for *whom*. Sustainable economics examines these same questions, but includes future generations in the "for whom." It asks how the irreplaceable resources—water, air, soil, and fish and wildlife—can be adequately conserved. It also recognizes that economic mechanisms that do not efficiently and equitably satisfy human needs are not likely to be sustainable.[2]

Sustainable economics analyzes issues complicated by politics, ideology, and nationalism. It tries to ascertain what works to make resource use more efficient. How do people behave in relation to their natural resources? How does a country's economic system alter its prospects for survival? The beginnings of an answer can be formed by measuring national performance in food security, energy efficiency, environmental pollution, and equity.

The issue is not socialism versus capitalism; it is the efficacy with which economic systems achieve their intended ends. Ideally, nations could be graded for degree of market orientation and assessed for changes in resource use. But no one has yet invented a grading system for economic philosophy or for environmental sus-

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tainability. It is instructive, nonetheless, to categorize nations as centrally planned or not and assess their resource-use efficiency. A centrally planned economy is one that through price controls, state ownership, or allocation of capital, effectively manages more than half of a nation's industrial and agricultural production.

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From the end of World War II until recently, centralized state-planning served as a model for almost half the world. Newly independent Third World countries faced with the choice between centralized control and market orientation usually chose the former. That their foreign rulers had been capitalists turned them against market systems, while the tradition of colonialism eased the transition to tight central control. In the postwar era, many military states and even most market-oriented nations also expanded the role of government in the day-to-day management of their economies.

The world today is poised at a turning point in economic management. The abrupt Chinese shift to market mechanisms is the most dramatic example, not only because of the vast population affected, but because of the reform's spectacular early successes. Many African nations, plagued with agricultural decline, have begun to extend market incentives for agriculture. Latin American nations, plagued with debt, have moved to sell off state-owned companies. The World Bank has helped spur this movement by providing technical advice and financial assistance. The Soviet Union, meanwhile, its confidence in uninterrupted growth shaken, is debating the need for economic reform. Ironically, although Western countries have also begun to sell off state-owned concerns, they increasingly subsidize private agriculture, restrict trade, and permit concentration of economic power in industrial conglomerates.

Changing reliance on the market should have significant human and environmental consequences. Pollution was once closely associated with capitalism. Early in the century the economist A.C. Pigou criticized laissez-faire policy for the external costs that it imposes on society. He explained that a factory owner has no incentive to spend money to reduce the sulfur dioxide or toxic waste a factory produces. Oscar Lange, the socialist theorist, reasoned further that state ownership of the means of production would end motives to pollute, for

"Until recently, centralized state-planning served as a model for almost half the world."

why would the state contaminate itself and reduce its own wealth?[3] He did not foresee that factory managers might lose bonuses or face punishment for failing to meet production targets. Such managers have every reason to commit all their resources to the pursuit of quotas, not to cleaning up effluents.

The choice of who allocates resources is crucial. In *The Wealth of Nations,* Adam Smith compiled spectacular examples of government mismanagement and argued that the free market should be left alone to allocate resources. Markets alone, he reasoned, could assemble and convey essential information about scarcity and value. Prices and profits would work to maximize production and minimize resource use. Though overcutting of forests had already become an issue in England by 1776, when Smith published his classic book, he argued that market mechanisms were sufficient to protect forests. Growing scarcity would drive up the price of wood, reduce consumption, as well as prompt landowners to plant more trees in anticipation of higher prices.[4] He could not have predicted that acid rain would kill forests in Western Europe, or that the subsequent oversupply on the timber market would hold down prices. On the other hand, he might have felt vindicated by the price-induced energy conservation response in the West since 1973, arguably the most significant conservation achievement of our time.

The efficiency with which nations produce food and consume energy make useful indicators of their progress toward sustainability. Countries of all political stripes seek to avoid excessive dependence on food imports. Air and water pollution and land disruption are closely associated with agricultural production and energy-use efficiency. Thus, if market pricing and competition provide greater efficiency, both economists and environmentalists have a stake in the changing role of the market in the world's economies.

Efficiency in Agriculture

Some environmentalists reject both markets and bureaucratic planning as incapable of dealing with the crisis of sustainability.[5] Putting a sober twist on that old joke, "In capitalism, man exploits man. In

socialism, it's the other way around," they say both exploit nature. But important differences exist between systems, as shown by comparing their efficiency in agricultural production.

Agricultural production can critically affect the consumption and disruption of resources—water, wood, and air. Soil erosion and deforestation can result from low agricultural productivity if new, marginal lands are pressed into production to make up for lost potential. Overuse of chemicals can cause water pollution. Efficiency is consequently an essential ingredient of agricultural sustainability.

Economists define efficiency, roughly, as maximizing output while minimizing input. When farmers produce a given value of grain with a least-cost combination of land, labor, fertilizer, and machinery, production is efficient. When grain production increases faster than consumption of the inputs, productivity and the outlook for sustained production improve. When productivity declines, a society is headed for trouble. Inflation, the need for costly imports, even famine can result.

Land and labor productivity, two partial but important measures of performance, reveal several advantages of market orientation. Crop production per hectare is generally higher in market-oriented countries. (See Table 1.) Factors other than the economic system affect these ratings, such as rainfall levels, inherent soil fertility, and farm price policies that may either encourage or discourage farm efficiency. Japan's heavy population pressure, for example, has pushed it to increase land productivity, but this explains only about a third of its advantage over the Soviet Union. The remainder is attributable to policies that, for example, keep prices high, encourage larger numbers of farmers engaged in agriculture, and keep farm size low. Similar policies have placed Hungary even higher in land productivity.[6]

Ranking nations by agricultural labor productivity shows a dramatic advantage for market economies. Western European countries enjoy labor productivity rates often double that of Eastern European nations, while the United States outperforms the Soviet Union by a factor of almost 20. Only one-third of the difference between the

Table 1: Productivity in Grain Production, Selected Countries, 1984

Country	Economy Type	Land Productivity	Labor Productivity
		(metric tons/ha)	(metric tons/worker/yr)
United States	M	4.4	160.3
United Kingdom	M	6.6	57.3
France	M	6.0	34.2
West Germany	M	5.3	29.2
Hungary[a]	M	5.4	23.6
East Germany	C	4.5	14.9
Italy	M	3.9	10.2
Soviet Union	C	1.4	8.5
Yugoslavia[b]	C	4.2	5.2
Poland	C	3.0	4.3
Mexico	M	2.1	2.6
Japan	M	4.1	2.1
Philippines	M	1.4	1.1
Egypt[b]	C	4.0	1.1
China[a]	M	3.3	1.1
India	M	1.3	0.8

M = Market-oriented; C = Centrally planned agricultural sector. Industrial sector may be centrally controlled.

[a]Agricultural sector only.
[b]Ostensibly market-oriented, but government intervention is pervasive.

Source: World Grain Statistics Computer Printouts, U.S. Department of Agriculture, Washington, D.C., 1986, and U.N. Food and Agriculture Organization, *FAO Production Yearbook 1984* (Rome: 1985).

United States and the Soviet Union is due to the greater resource endowment of the United States, the rest is due to policy. Labor productivity naturally tends to be higher when farmers earn high

incomes, which in turn indicates higher levels of development, a central goal of economic policy. Again, Hungary ranks among the highest in Eastern Europe.[7]

10 The Hungarian model holds important lessons for the rest of the world, for it shows that market economics can work even in the absence of private land ownership, as long as the producers effectively control their work. It was the Hungarian experiment, moreover, that paved the way for the Chinese reforms.

Hungary, the most market-oriented country in Eastern Europe, and possibly the most responsive to quality-of-life issues, developed an alternative to central planning called the New Economic Mechanism. Initiated in 1968 by János Kádár, it resembled both in name and substance the New Economic Policy of Lenin who, in frustration with the failure of centralization, introduced some market mechanisms in the Soviet Union just before his death. Stalin later abolished these and established growth as the fundamental measure of performance. But Hungary, with a few setbacks from what has been called "the conservative left-wing," has increasingly relied on prices and profits in agriculture to determine the what, how, and for whom of their economic policy.[8]

Hungary ranks relatively high in the world in land productivity, much higher than nearby Poland. Though inefficiency and shortages are often associated with collective agriculture, three-fourths of Hungarian agricultural land is state- or cooperative-owned. Ironically, three-fourths of Poland's agricultural land is in private hands.[9]

István Láng, Secretary General of the Hungarian Academy of Sciences, explains the Hungarian-Polish paradox in terms of properly fashioned incentives. Hungary produces two-thirds more grain per hectare than Poland. Láng observes that only 30 percent of this productivity difference can be explained by the fertility of Hungarian soil, that is, by the resource endowment. The rest is attributable to policy measures—incentives for production, and the technological improvements these measures bring. Noting that Hungarian farms are run mainly by cooperatives, he says that the cooperatives "are real cooperatives," meaning that they are self-managing. The cooper-

"The Hungarian model shows that market economics can work even in the absence of private land ownership, as long as the producers effectively control their work."

atives, not the central state apparatus, decide what they will grow and how they will grow it. If they choose to raise potatoes when meat is in demand, then they lose money. But if they respond to the market and use their food production resources efficiently, they profit. They have an incentive to work hard and efficiently to produce what is needed.[10]

Hungarian state farms, though having a relatively small share of total output, manage grain production on contract. Growing specific products at set prices, the managers can earn additional income from more efficient production. The nation distributes these products without the excessive losses in storage and transportation common elsewhere in Eastern Europe. The overall result is a food surplus for export and land productivity that compares favorably with the West. Hungary is the answer to critics who say that the Chinese agricultural experiment is succeeding only because "China is China." The lines to buy food so common in many centrally planned economies do not exist in Hungary.

The low Polish agricultural land productivity, moreover, cannot be attributed to private ownership per se, but rather to the impasse resulting from the central control imposed on Poland's farmers. Strictly regulated prices reduce profitability for farmers, and deprive them of capital to invest in machinery and fertilizers that raise productivity. Following World War II, Polish farmers were reluctant to make such investments for fear that their farms would be nationalized, and the state was unwilling to invest in private land. As a result, Poland still has 1.6 million horses doing the work of tractors and trucks.[11] It is not uncommon to see farmers harvesting wheat or hay by hand, using only scythes. Poland, once a breadbasket of Europe, now has to import food from the West.

The two Germanies make an interesting comparison of market-oriented and centrally planned agriculture. Because the two countries were created from one culture at the same time, contrasting their economic systems represents the closest approximation to a controlled test. West German land and labor productivity, measured in physical units of grain production, exceed East Germany's by 20 percent and 100 percent, respectively. Measured in value of total farm

output, West German labor productivity is triple that of East Germany.[12]

12 East Germany, however, does outperform Hungary in both measures, when considered in terms of economic value. Although the two countries use almost exactly the same amount of fertilizer, East Germany is slightly higher in land productivity and more than one-third higher in labor productivity. Some observers attribute this difference to East Germany's access to West German markets and technology, others point to German culture, education, and work ethic. East Germany's record is a reason why the Soviet Union has not given up on centralized agriculture. Yet skeptics question whether East Germany's attainments can be replicated elsewhere.[13]

Land productivity says little about the "total factor" productivity of an agricultural system, which also takes into account inputs of labor, fertilizer, and machinery or animals. Efficiency can be distorted and productivity diminished by poorly crafted policies. For example, high price subsidies and protective trade barriers account for part of the relatively high land productivity in Japan. Consumers bear the cost of these distortions, paying almost three times the import price for rice and other commodities.

Total factor productivity is relatively easy to determine in a perfectly competitive economy. Ideally, farmers follow price-signals to decide how much to spend on production, and they maximize their earnings by choosing the least-cost combination of labor, land, machinery, and fertilizer. According to microeconomic theory, farmers produce at a level so that the cost of their last, or marginal, unit of production—their most expensive ton of grain—just equals the price they receive. They maximize profits in this case, making efficiency and productivity almost synonymous. In nonmarket economies, prices of resources usually do not reflect their scarcity, and so resources must be allocated by plan, a fact that directly affects productivity.

Lung-Fai Wong, a U.S. economist, has extensively analyzed productivity trends in centralized agricultural economies. He shows that between 1960 and 1980 total agricultural productivity declined in the Soviet Union, China, and all Eastern European countries. The Sovi-

"China boosted grain output by a third between 1978 and 1986, and provided improvements in per-capita consumption that stand in marked contrast to Soviet trends."

ets, Romanians, and Poles experienced total productivity declines of more than one-third. By contrast, the United States and Japan over this period increased total productivity—from far higher levels. If this long-term decline of total productivity in Soviet agriculture continues, it will become more difficult to sustain economically. (See Figure 1.)

Wong notes that while total productivity declined in centrally planned nations' farm sectors, land and labor productivity increased. He attributes this apparent inconsistency to inefficient allocation of fertilizer and machinery. Bonuses paid to Soviet state farms to meet quotas push them to use excessive amounts of fertilizer. Their incentive is not to maximize yields while cutting costs, only to meet quotas. Soviet cooperatives have more incentive to cut costs, but resources are allocated by central government planners rather than at the farm level. Overall, improvements in yields per hectare and per worker have been won at the expense of inefficient use of fertilizer and tractors.[14]

Post-Mao China provides a rare and vast laboratory for testing the effect of greater reliance on market mechanisms in agriculture. China before 1978 typified Soviet-style agriculture. But in December 1978, the Chinese decided to switch to market-oriented agriculture. The shift boosted grain output by a third between 1978 and 1985, and provided improvements in per capita consumption that stand in marked contrast to Soviet trends. (See Figure 2.) The shift also doubled oilseed production and raised meat production 80 percent. Significantly, this growth was achieved along with a 4 percent reduction in cultivated area, as highly erosive land was idled, and a decline in water and pesticide use. Shifting to the market spurred a dramatic increase in fertilizer use, a near doubling within the eight-year span. The increases in output and efficiency translated into higher rural incomes, which have grown as much during the eight years since 1978 as in the previous 30 years.[15]

In the West, resource efficiency in the agricultural sector is frequently undermined by heavy farm production subsidies, both with trade barriers and direct budgetary expenditures. In 1980, these policies cost the United States 18 percent of the value of U.S. agricultural output. But by 1983, they cost almost half the total value of ag-

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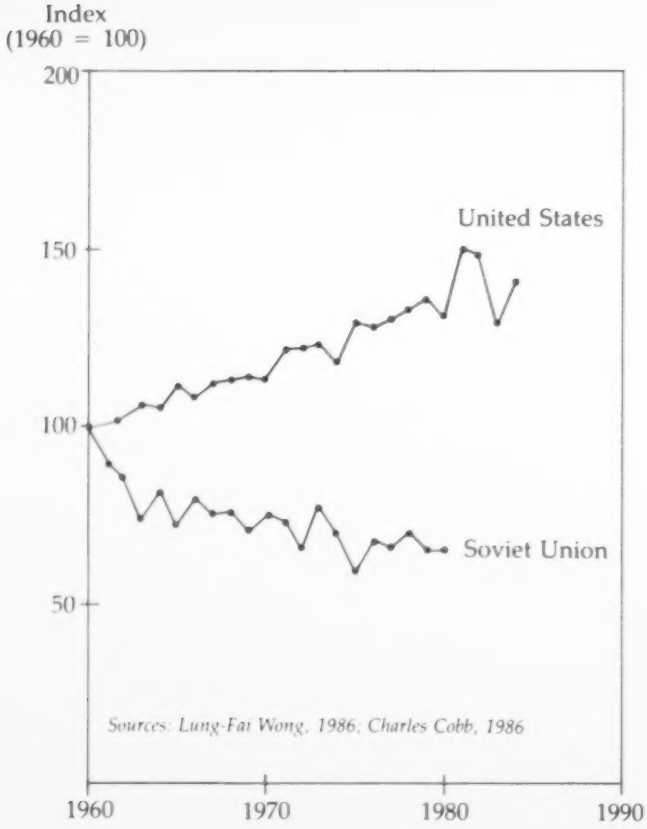

Figure 1: Total Agricultural Productivity for the United States and the Soviet Union, 1960-84

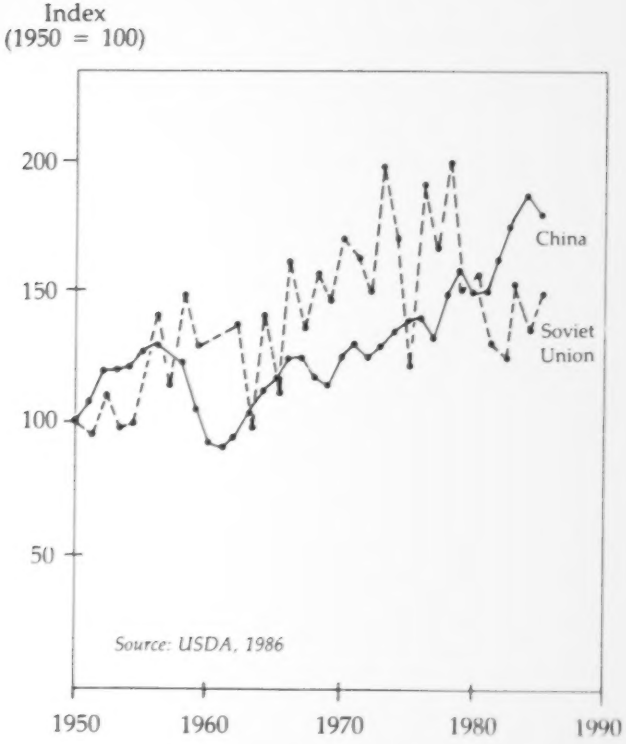

Figure 2: Grain Production Per Capita in China and the Soviet Union, 1950-85

ricultural products. Taxpayer subsidies alone are projected to exceed $30 billion in 1986.[16]

The United States is by no means unique among market-oriented countries in failing to properly adjust agricultural policies. Japanese

farm price policies cost consumers and taxpayers 62 percent of the value of Japan's agricultural output in 1980, though this was reduced to 51 percent by 1983. Common Market countries' agricultural policies drive prices one-fourth above world market levels on most products. These subsidies hurt not only domestic consumers, but Third World exporters who could produce more efficiently and sell cheaper.[17] The policies have the aim of preserving and sustaining the farm sector and its way of life. But this goal could be equally well served without the damage caused by price distortions if governments substituted agricultural price supports with direct income transfers.

Misallocation of resources undermines economic sustainability. When the efficiency of resource use declines, real costs go up. Governments often compound the problem by protecting consumers from rising food prices with further subsidies, which can drive budgets into deficit and economies into decline.

Western nations, nonetheless, have long satisfied basic food and fiber needs, and government policies have played a major role in this success. When policies such as minimum price supports are provided in order to ensure food security and stabilize markets—that is, when supports are set below international market levels—they can be useful. When supports exceed world market levels, however, they interfere with trade, stimulate environmentally disruptive overproduction, and waste taxpayers' and consumers' money. These distortions, like their more pervasive counterparts in planned economies, have political motivations that may well be worthy. But their impact on environmental and economic sustainability cannot be ignored. Ultimately they are counterproductive.

Efficiency in Energy Use

Energy sustains modern societies. It not only reduces drudgery and makes inhospitable climates habitable, it substitutes for scarce resources. Energy permits us to replace copper with aluminum, wood with iron, time with speed. It has been sanctified by economists with a place in their production functions—equations incorporating labor,

capital, and other factors into least-cost combinations. Energy inefficiency can undermine a society's sustainability. In the worst case, pollution resulting from inefficient energy use may make entire regions uninhabitable.[18]

The centrally planned economies of Romania and Hungary use twice as much energy per unit of gross national product (GNP) as the United States, and five times as much as France and Sweden. (See Table 2.) Stated otherwise, if Eastern Europe and the Soviet Union were to increase their incomes to Western levels, they would need twice as much energy per capita as Western nations. Their poor ranking is related in part to their stage of development—they have poorly developed service sectors. But their industries are highly energy-inefficient in both the economic and the physical sense.[19] And sustained development, of any type, is unlikely without energy efficiency as energy supplies decline and environmental impacts of fuel-use worsen.

No national economy is more energy-inefficient than Hungary's. József Bognár, who helped develop the New Economic Mechanism, attributes this fact to mark-up pricing. Industry determines prices for its finished products on a cost-plus basis; the higher the input costs, the larger its net share of revenues. Because the net "profits" are distributed to managers and workers as bonuses, they actually have an incentive to consume energy![20]

Hungarian economist János Kornai has written extensively on this phenomenon, which he describes in terms of "soft and hard budget constraints." A budget constraint is soft if cost increases can be passed on, or if government will bail out an industry rather than lose the firm's production or create unemployment. If the constraint is soft, little discipline or incentive exists to bring about efficiency improvements. International trade, to some extent, does provide the impetus to cut costs in order to compete with more efficient producers. Heavy dependence on trade is an important reason why resource-poor Japan is so efficient. Hungary also depends heavily on exports, which the government often subsidizes to earn foreign exchange. Kornai's soft budget constraint reflects policies governing all

Table 2: Efficiency of Energy Use, Selected Countries, 1983

Country	Economy Type	Energy per Dollar of GNP
		(megajoules)
France	M	8.6
Sweden	M	8.6
Japan	M	9.7
Spain	M	11.8
West Germany	M	11.8
Italy	M	12.9
United Kingdom	M	17.2
United States	M	19.3
Yugoslavia	C	21.5
Poland	C	26.9
East Germany	C	29.0
Czechoslovakia	C	30.1
Soviet Union	C	32.3
Romania	C	37.6
China[a]	C	40.9
Hungary[a]	C	49.5

M = Market-oriented; C = Centrally planned.

[a]Though the agricultural sectors of these economies are now market-oriented, their industrial sectors are centrally controlled.

Source: Worldwatch Institute. Data for energy consumption and most dollar GNPs from World Resources Institute and International Institute for Environment and Development, *World Resources 1986* (New York: Basic Books, 1986). Dollar GNPs for the Soviet Union and Eastern Europe are adjusted 1980 levels estimated in Paul Marer, *Dollar GNPs of the USSR and Eastern Europe* (Baltimore: Johns Hopkins University Press, 1985).

of Eastern Europe, the Soviet Union, much of the Third World, and a modest share of the Western economies.[21]

Gábor Hoványi, a Hungarian industrial economist, argues that in addition to mark-up pricing and soft budgets, efficiency is affected by policies that reduce trade, limit foreign exchange, distort wages and reduce investment. These factors critically affect innovation, which is essential if growth is to continue without exhausting resources.[22] Innovation for energy efficiency in steelmaking offers a basis for comparing performance in market-based and centrally planned economies because steel has long been an essential component of industrialization. It is also the world's foremost energy-consuming industrial activity.[23]

Though the Soviet Union now leads the world in total tons of steel produced, it is close to last in efficiency, using 31 gigajoules of energy per ton compared to the Japanese standard of 19 gigajoules per ton. An important reason for Soviet inefficiency in steel production is a lag in innovation of new technology. The Soviet Union, like all of Eastern Europe, trails far behind the West in the use of the more efficient basic oxygen furnace. This furnace has, with the electric-arc furnace, completely replaced the obsolete open-hearth furnace in Japan. The Soviets, however, still use the open hearth to produce over half of their steel. Other centrally planned economies also rely heavily on this outmoded, inefficient technology. Even East Germany, with its reputation for technical prowess, uses the open-hearth furnace for 45 percent of its steel production.[24]

Moreover, the Soviets recycle very little steel. They have lagged far behind the West in the adoption of the electric-arc, or "recycling" furnace, which is usually fed almost exclusively with recycled scrap instead of virgin iron ore. (See Table 3.) The Soviets truly are, in Khrushchev's words, "steel eaters."

The ranking of nations by rate of materials use follows a similar pattern to that of their efficiency in steel production and energy use. Whether this matters for sustainability depends fundamentally on energy availability. Physical scientists like Alvin Weinberg and Hal Goeller argue that materials have infinite substitutes, as long as energy is available.[25]

Table 3: Innovation in Steel Production Technology, Selected Countries, 1985

Country	Economy Type	"Inefficient" Open Hearth	"Recycling" Electric Arc
		(percent of production)	
Spain	M	0	61
Italy	M	0	53
South Korea	M	0	31
United Kingdom	M	0	29
Japan	M	0	29
West Germany	M	0	19
Brazil	M	4	25
United States	M	7	33
Romania	C	29	22
China[a]	C	31	19
Yugoslavia	C	34	26
India[a]	C	42	19
Poland	C	42	15
East Germany	C	45	31
Hungary[a]	C	51	13
Soviet Union	C	57	11

M = Market-oriented; C = Centrally planned.

[a]Though this country's agricultural economy is market-oriented, its industry is not.

Source: Data sheets, International Iron and Steel Institute, Brussels, Belgium; and Maurice Y. Meunier and Oscar de Bruyn Kops, *Energy Efficiency in the Steel Industry with Emphasis on Developing Countries* (Washington, D.C.: World Bank, 1984).

A clear demarcation exists between market-oriented and centrally planned economies. Governments directly controlling agricultural production show relatively low efficiency in land and labor produc-

tivity, and, frequently, declining total productivity. Where they directly control industrial production, energy efficiency is low as well. These facts indicate that centrally planned economies probably would create more goods and services with a given level of resources if they relied more on markets. But that does not mean that markets alone can keep nations within the bounds of sustainable development. Even less does it mean that the market alone will solve problems of inequity and human need.

The Equity Question

In the mid-nineteenth century, Karl Marx predicted that revolution and a dictatorship of wage earners would overtake capitalist countries because governments would never correct the market failures that made life miserable for many though profitable for a few. Malthus, before him, forecast that diminishing returns on land and capital would, with a growing population, end in collapse.[26] Malthus's prediction has so far been negated by technical innovation, while Marx's has been subverted by social innovation.

Agricultural and industrial technologies have permitted increased production with fewer resources. Western macroeconomic policies have more or less maintained employment and reduced labor exploitation. But any change in economic policy will touch the most basic human concerns. At stake are this generation's ability to buy food, shelter, and fuel, and future generations' prospects to produce these necessities from the resources they will inherit. The prospects of future generations depend on the resource husbandry of the present one, for depletion of soils, forests, fisheries, and energy sources can be catastrophic. The consequences of neglect can be seen in the famine and relocation of people in northern Ethiopia, where soils no longer support agriculture and forests have disappeared. For this reason, the fairness with which centrally planned and market-oriented systems distribute resources among and between generations is vital.

Equity means different things to different people. Definitions range from equal incomes to equal opportunities. Equity can be gauged

with such measures as income distribution, longevity, and infant mortality. Calculation of the equity ratio permits easy comparison of how income is distributed between the rich and the poor within a nation. The equity ratio is the income share of the richest 20 percent of a population divided by that of the poorest 20 percent. Here, income share includes nonmonetary benefits such as special shopping privileges, housing allowances, and recreational facilities provided for the elite in some countries.

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Ranking nations by equity ratio shows no clear advantage for either centrally planned or market economies. East Germany and Romania are slightly more egalitarian than most nations, but many—much richer—Western nations have similar distribution levels. The equity ratios of Japan and West Germany are only slightly worse than that of East Germany. (See Table 4.) A poor West German would on average be much richer in absolute terms—by $900 per year—than a poor East German. A poor East German, on the other hand, would on average be about $100 per year richer than a poor American, though a poor American would be over $1,000 per year richer than a poor Soviet. Countries that have justified central control for equity purposes have little advantage in equity and compare poorly in absolute income.[27]

Income statistics reveal only one aspect of equity. Ready access to health care, for example, is another important factor in the equation. Longevity and infant mortality rates reveal much about the quality of life and human services in a country. A ranking based on average life spans shows market-oriented countries at the top, although both market and nonmarket countries are found in the lower ranks. (See Table 5.) Market-oriented countries also have the lowest rates of infant mortality. Their relative advantage probably lies in higher-quality health care made possible with higher incomes. Smoking and alcohol prevalence tend to be lower in the West, which means reduced disease.[28]

Government leaders may worry about inequity not revealed in national statistics. Confronted with the dilemma of how to protect producers or consumers from economic reforms, they may implement subsidies or manipulate price mechanisms to ensure some level of equity. Pakistan, for example, faced higher food prices be-

Table 4: Income, 1983, and Income Distribution, circa 1980, Selected Countries

Country	Economy Type	Equity Ratio[1]	Average Income of Poorest 20 Percent
			(1983 dollars)
Romania	C	3	1690
East Germany	C	3	3660
Japan	M	4	4545
Soviet Union	C	4	2345
West Germany	M	5	4570
Poland	C	5	1630
Spain	M	6	1680
United Kingdom	M	6	3170
Hungary[a]	C	6	1650
Sweden	M	6	4340
India	M	7	90
Yugoslavia	C	7	970
Italy	M	7	1905
South Korea	M	8	600
United States	M	8	3522
China[b]	C	8	na
Thailand	M	9	240
France	M	9	2600
Philippines	M	10	190
Brazil	M	33	190

M = Market-oriented; C = Centrally planned.

[1]Ratio of income received by richest and poorest fifths of the population.

[a]Classification here refers to total economy. The market-oriented agricultural sector represents only one-fifth of the economy.
[b]Distribution figures used here predate the 1978 economic reforms.

Sources: World Bank, *World Development Report 1986* (New York: Oxford University Press, 1986); Christian Morrisson, "Income Distribution in East European and Western Countries," *Journal of Comparative Economics*, Vol. 8, No. 2, June 1984.

Table 5: Life Expectancy in Selected Countries, 1983

Country	Economy Type	Life Expectancy (years at birth)
Sweden	M	77
Japan	M	77
Spain	M	76
United States	M	75
France	M	75
West Germany	M	74
United Kingdom	M	74
Italy	M	74
East Germany	C	72
Poland	C	71
Romania	C	71
Hungary[a]	C	70
Soviet Union	C	69
South Korea	M	66
China[b]	C	64
Brazil	M	63
Thailand	M	63
Philippines	M	62
Egypt	C	58
India	M	53

M = Market-oriented; C = Centrally planned.

[a]Classification here refers to total economy. The market-oriented agricultural sector represents only one-fifth of the economy.
[b]Health achievements in China predate the economic reforms.

Source: Population Reference Bureau, "1986 World Population Data Sheet," Washington, D.C., 1986.

cause oil price increases had driven up the cost of fertilizer. Much of Pakistan's "green revolution" had been due to higher fertilizer inputs. But rather than take the unpopular move of raising food prices, the Pakistani government instead subsidized the fertilizer used by farmers. The result was uneconomic fertilizer use and unsustainable budget burdens. The Pakistani government has since moved to phase out the subsidies completely, raising food prices to compensate.[29]

Thailand, the world's largest exporter of rice, is a case study in the effect of controlling prices to protect the poor. Since yielding monopoly control of rice exports in 1954, the government has maintained two mechanisms to control the domestic price of rice. Thai exporters must sell a specified quantity of rice below market price to the government; this creates a rice reserve which ensures low-cost rice for all urban consumers. Exporters must also obtain a license to export, and these are granted with careful attention to domestic prices. When the world market price goes up, the Thai government restricts exports in order to keep the domestic price acceptably low. The International Food Policy Research Institute estimates that these mechanisms kept Thai rice prices 37 percent below the world price between 1960 and 1982.[30] The farmers are in effect taxed for their initiative, and though they are relatively rich, earn on average less than $1,000 per year per capita.

Leaders who would make their economies more market-oriented may also pause to consider the problem of unemployment. Chronic unemployment and the spawning of a permanent underclass rank among the West's most serious problems. The Soviet Union's accomplishment of zero unemployment, though it has been achieved at the cost of great labor inefficiency, may nevertheless be seen as an important attainment, particularly when compared with 7 percent unemployment in the United States and 10 percent average unemployment in Western Europe.[31] At the same time, reformers in Eastern Europe understand that the only short-term alternative to inefficiency and stagnation may be to "shed labor." The pain of this step can be eased by providing a social safety net of unemployment benefits or make-work, but these require the political skill to effect an income transfer from the employed. There may be a direct conflict between efficiency of resource use and unemployment, which may

also be seen as a conflict between generations, for inefficiency in resource use reduces future prospects.

26 Economist Talbot Page has called attention to the absence of indices to evaluate equity for future generations. He portrays our inability even to consider future needs by imagining a referendum on how to treat the future fairly: One party would campaign for laissez-faire; another for conservation. The former would carry placards promising productivity, the latter would carry signs promising a guarantee for the future's right to life with conservation.[32] If representatives of the future were able to vote in such a campaign, they might reject the notion that the living should maximize growth, wealth, and incomes. Letting each generation in turn maximize its own benefits from natural resources would be like allowing nations to take turns managing resources. One year Japan would have the rights to all the world's fish and would decide how many to catch. The next would be the Soviet Union's turn, then Norway's, and so on. The last in line might worry about their fairness and altruism. Yet, future generations looking back through some time-warp might view our generation with justified skepticism. They might be interested to know how different economic families within this generation were behaving toward them, especially with regard to nonrenewable resources.

While the environmental problems of the West are well known, information on those of centrally controlled economies is sketchy. But evidence is mounting that environmental disruption in these nations is severe. When Marshall Goldman wrote *The Spoils of Progress* in 1972, he showed that environmental pollution problems are as familiar to socialism as to capitalism. Today, however, the efficiency improvements made by Western market-oriented nations, combined with regulatory policies to correct market failures, have begun to ameliorate their conservation problems while those in the centrally planned economies worsen.[33]

Even in the early seventies it was becoming difficult to find an unpolluted river in the Soviet Union. Goldman reported that fish kills had occurred all over the country, especially in the Volga, Ural, and Dnepr rivers. He found water use in steel mills to be 40 to 150 percent higher than in the United States, and similar water-use inefficiency in

"Western market-oriented nations have begun to ameliorate their conservation problems with regulatory policies, while those in the centrally planned economies worsen."

refineries and agriculture. Sulfur dioxide and nitrogen oxide emissions approached lethal levels in some areas, not unlike the deadly smogs of Donora, Pennsylvania, and London, England, of many years ago. Toxic emissions of lead and fluoride were permitted in large quantities. Lead concentrations in one city in eastern Kazakhstan reached 14 times the maximum permissible level. Timber in the Ukraine had nearly disappeared, and coal surface-mining, with its profoundly disruptive effects, had proliferated. Natural areas, including spectacular Lake Baikal, the world's largest and oldest freshwater lake, have been exploited and seriously disrupted. Some 50 factories were built during the sixties along Lake Baikal's shores and four-fifths of them discharged their raw wastes into the water. Goldman concluded that, "Unfortunately the rape of Lake Baikal shows that public greed and lust can be as destructive as private greed and lust."

More recently, Goldman noted that the Soviet Union has made some progress in environmental protection. Fish have returned to the Moscow River, and air and water pollution have been reduced. The Soviets may also be relying more heavily on natural gas to reduce environmental burdens. But the scant literature available in the West on Soviet pollution suggests that the problems remain serious and uncorrected. The recent disaster at the Chernobyl nuclear power plant reinforces the impression that Soviet safeguards against environmental disruption are weak.[34]

Poland is another example of the failure of central planning to control pollution. American analyst Stanley J. Kabala recently wrote in *Environment* that a by-product of Poland's Stalinist economy is "hundreds of miles of rivers unfit for *any* use and air pollution in nearly every major city 50 times worse than permissible limits." (Emphasis in original.) An analysis of Poland's environment prepared by planner Andrzej Kassenberg confirms this observation. Kassenberg has mapped extensive areas of environmental disruption due to toxic pollution, acid rain, and oxygen depletion in rivers. A visit to Upper Silesia reveals uncontrolled sulfur dioxide and particulate emissions tnat pour over populations living in industrial squalor. Ancient buildings and a wealth of history and culture in Kraków are being damaged by the pollution. Forests around Katowice show clear effects of

sulfur dioxide, ozone, and hydrocarbon emissions. One-third of the forest area in southwestern Poland has been affected; many of the young trees are already dead or dying.[35]

China also exemplifies the fact that central planning does not internalize environmental pollution costs but leaves them for future generations to bear. Destructive environmental trends existed in China before the communist military victory in 1949, but have intensified since. Deforestation is China's biggest environmental problem; large areas of trees were cut down to provide charcoal for the backyard steel furnaces of Mao's Great Leap Forward. Planned tree-cutting in Sichuan Province during the sixties exceeded sustainable yields by 160 percent. Overall, forest area between 1949 and 1980 is estimated to have declined by a quarter. One of the reforms recently undertaken to reverse this trend is to give incentives to peasants to plant and nurture trees: "Whoever afforests the land owns the trees." Their goal is to increase forest cover from about 12 percent of land area today to 20 percent by the year 2000.[36]

The environmental failures of centrally planned nations thus rank alongside those that rely on markets. The former fail to internalize environmental costs because incentives are provided to managers to boost production. Moreover, the resources allocated to the managers reflect no scarcity value, no opportunity cost, no real price—the cost of using the resource is essentially irrelevant. The absence of prices and competition leads to inefficiency as well as widespread environmental abuse.

Energy productivity trends show a marked divergence between some centrally planned and most market-oriented economic systems. Energy-use per unit of output between 1970 and 1983 has increased in the Soviet Union, Bulgaria, Romania, and Yugoslavia. Western European countries meanwhile reduced consumption per unit of output by an average of 14 percent over that 13-year period.[37] Since 1970, the United States dramatically reduced energy consumption per unit of output—by 30 percent. The Soviet Union, however, still requires an additional 1.2 percent of energy for each 1 percent of economic growth.[38] (See Figure 3.)

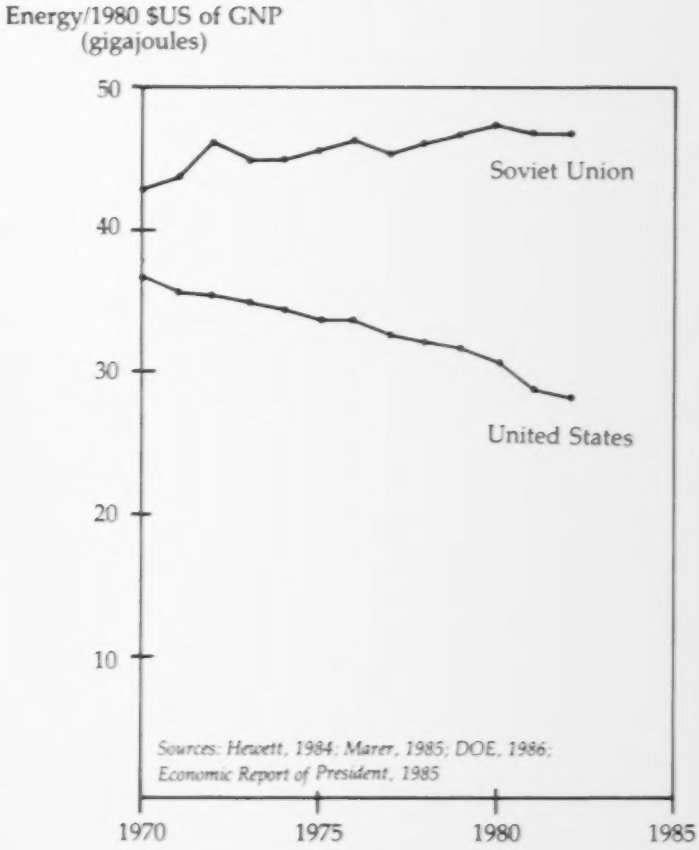

Figure 3: Energy Consumption per 1980 $US of GNP for the United States and the Soviet Union, 1970-82

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Increasing energy-use trends bode ill for future generations not only because fuels could be exhausted. Energy use is directly related to air, water, and land disruption, as extensive acid-rain-related damage in Europe makes clear. Comparing nations' performances in controlling sulfur emissions provides a more direct measure of how economic systems affect future generations by diminishing the resource base.

Ranking nations by sulfur dioxide emissions per dollar of output shows a sharp demarcation between East and West. Czechoslovakia's rate is eight times West Germany's. (See Table 6.) The Soviet rate is almost three times that of the United States.[39] The Soviets, like the Japanese, have reduced emissions somewhat by consuming oil instead of coal in power plants. It remains true that the United States emits a quarter of worldwide sulfur dioxide gas, but since the early seventies, it has cut per capita sulfur dioxide emissions by a third while the Soviet Union has increased them by a similar proportion. (See Figure 4.) Eastern European and Soviet rates of sulfur emissions are high as a result of their economic strategy, as well as dependence on coal in Eastern Europe and almost complete lack of emissions control there and in the Soviet Union. The parallel in the West is West Germany's absence of auto-emissions controls and the failure of the United States and the United Kingdom to join nations agreeing to reduce emissions by 30 percent. But in damage per unit of output, Western nations rate far better than centrally planned ones.

Sustainable economics, in summary, requires several guidelines. Two criteria for choice of investment or consumption are particularly valuable: the net present-value criterion and the conservation criterion. The former represents efficiency and merely says that the investment has to be a good one, one that maximizes output while minimizing the cost of inputs. Under the theory of sustainability, it is a condition that can be met, however, only as long as the conservation criterion is met. That is, one can maximize the use of agricultural land, as long as the productivity of the resource can be maintained. Only if the conservation criterion is met first and the present-value criterion fulfilled second can both inter- and intra-generational equity be achieved. Markets alone cannot accomplish this, but to a large degree they offer a self-administering check on resource waste: The resource user pays for inefficiency. Nonmarket systems lack this internal correction.

Table 6: Sulfur Dioxide Emissions, Selected Nations, 1982

Country	Economy Type	Per $1000 of GNP (kilograms)
Japan	M	1
Sweden	M	4
France	M	5
West Germany	M	5
United States	M	7
United Kingdom	M	8
Canada (1980)	M	18
Soviet Union	C	19
Romania	C	28
Hungary	C	31
East Germany	C	35
Czechoslovakia	C	40

M = Market-oriented; C = Centrally planned.

Sources: Worldwatch Institute, derived from Organisation for Economic Co-operation and Development, *OECD Environmental Data: Compendium 1985* (Paris: 1985); N. Highton and M. Chadwick, "The Effects of Changing Patterns of Energy Use on Sulfur Emissions and Depositions in Europe," *Ambio*, Vol. 11, No. 6; World Bank, *World Development Report 1984* (New York: Oxford University Press, 1984); and Paul Marer, *Dollar GNPs of the USSR and Eastern Europe* (Baltimore: Johns Hopkins University Press, 1985).

Theoretically, centrally planned economies could make resource conservation a high priority. But the evidence to date shows that they have not. And economic and psychological theories suggest that without meaningful price signals to prompt them, economies are not likely to use resources efficiently.

Changing Reliance on Markets

If the nineteenth century was the age of the free market, the twentieth is the age of the state. Current trends, however, could well make

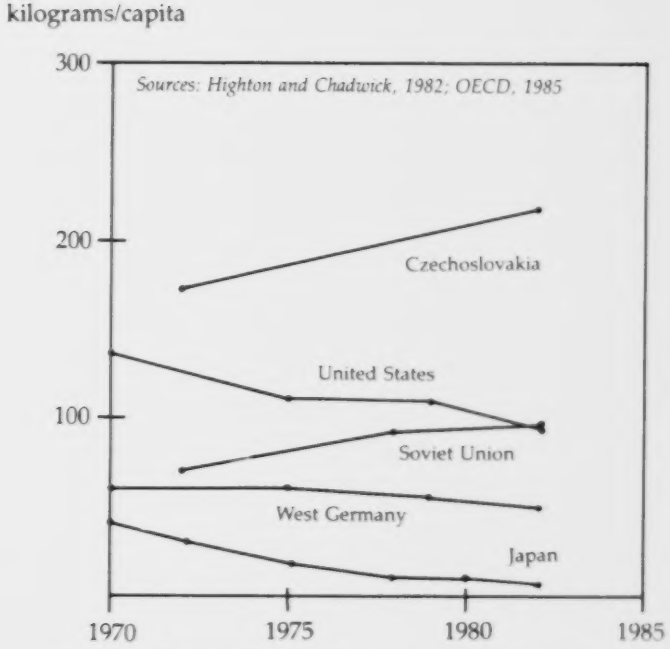

Figure 4: Sulfur Dioxide Emissions Per Capita in Selected Countries, 1970-82

the next century more balanced between markets and state intervention. A shift back toward markets has been prompted by five recent developments: Mao's death and his legacy of underdevelopment in China; the debt crisis in Latin America; the crisis of famine and underdevelopment in Africa; chronic underdevelopment in South Asia; and burgeoning deficits in the West. These economic dilemmas have their roots in resource use, and policy responses to them concern environmentalists as well as economists.

"State control of global production peaked in the seventies."

Centralized planning grew rapidly around the globe after World War II, especially in developing countries. States everywhere sought to achieve social development goals, equity, and security by nationalizing the means of production, imposing price and wage controls, and distributing subsidies. Such was the case in Egypt when Nasser gained power from the British in 1951 and nationalized industry. It was also the case in 1967 when the United Kingdom took control of its own steel industry. Nationalizations had generally run their course by the mid-seventies, except in France which under Socialist President Mitterand nationalized many industries in 1981.

State control of global production peaked in the seventies. At that time, about 30 percent of all people lived in Eastern Europe, the Soviet Union, and China. Adding the populations of the Middle East, most of Africa, South Central Asia, and most of South America and Mexico (where the state directly controlled about half of all economic activity), three-fifths of the world's economies were controlled by governments. About 60 percent of actual output, however, came from market economies.

The eighties brought hard economic times and reversed the process of centralization. The oil shocks, inflation, and stagnation of the seventies made economic inefficiencies both obvious and intolerable. At first, nations responded with greater control of prices, investment, and consumption, and consequently failed to adjust to new realities. Finally, some leaders began to realize that debts, deficits, inflation, and stagnation were signals that their policies were not sustainable.

The need for change prompted a worldwide reevaluation of the market mechanism. The extent of that change is hard to measure, if only because ownership and control are difficult to establish. Chinese farmers, for example, do not own the land they farm but they control it like private property. Despite similar ambiguities elsewhere, it is nonetheless possible to ascertain qualitatively the changing role of the market and its effects.

Worldwide, government enterprises produce about one-third of the world's industrial output. Dependence on state firms ranges from being almost exclusive in the Soviet Union to being minimal in the

United States. (See Table 7.) Western nations generally own or control less than 10 percent of their national output, with the important exceptions of the United Kingdom, Italy, and France. Even in Hungary, the most market-oriented Eastern European nation, two-thirds of output is produced by state enterprises, excluding agriculture. Third World countries generally fall between the East and West on the spectrum of state ownership.[40]

The Chinese reforms begun in December 1978 represented a major turning point, reflecting disappointment with the nonmarket systems tested under Mao. Mao's Great Leap Forward of the late fifties had caused enormous losses of production, even famine. That policy was followed by retrenchment, then the violent "Cultural Revolution" from 1966 to 1976. During this period China decentralized economic control, but put decision-making authority in the hands of local and provincial bureaucrats rather than the marketplace. Economic stagnation followed Mao's campaign to make China's regions self-sufficient, and pressure mounted for change. In the countryside, where 80 percent of the Chinese live, incomes in the two decades before the death of Mao grew by less than 10 percent. Rationing was common and a third of the grain consumed in cities had to be imported from abroad. Over a third of the state-owned enterprises were losing money in 1976.[41]

After Mao's death, Chinese leaders did not turn immediately to market mechanisms. Mao had chosen Hua Guofeng as his successor, and Hua chose to recentralize control. When Hua's efforts failed, the door was open for liberalization.[42]

The modernization programs of Deng Xiaoping have within less than a decade increased China's agricultural output by more than half, rural incomes by two-thirds, and industrial production by two-thirds.[43] By 1986, private retailers supplied Beijing with a third of its vegetables, eggs, and beef, and Hebei Province with two-thirds or more of its vegetables and eggs. New pricing policies gave farmers incentives to increase output. At first, they were obligated to deliver a minimum quota to the government at a fixed price. A higher price for deliveries over quota was then applicable, a premium that reached 50 percent for grain. Because retail prices were still set artificially low,

Table 7: The Role of State-Owned Enterprises in Selected Economies, Estimated, circa 1980

Country	Share of Steel Industry	Share of Coal Industry	State Share of Total Capital Investment
	(approximate fraction)		(percent)
Romania	1	1	95
Soviet Union	1	1	95
Hungary	1	1	66
China	1	1	66
Poland	1	1	66
Egypt	—[1]	—	48
Pakistan	—	—	47
India	¾	1	34
Mexico	¾	1	33
South Korea	¾	¼	33
Brazil	¾	1	23
United Kingdom	¾	1	17
Italy	¾	—	15
Spain	½	½	15
Thailand	—	—	13
France	¾	1	12
Japan	0	0	11
West Germany	0	½	11
Australia	0	0	10
United States	0	0	4

[1]Dash indicates insignificant steel or coal industry.

Sources: Mary Shirley, *Managing State-Owned Enterprises*, World Bank Staff Working Paper No. 577 (Washington, D.C.: World Bank, 1983); "Privatization: Everyone's Doing It, Differently," *The Economist*, December 21, 1985.

budget subsidies for agriculture reached approximately $23 billion in 1983, some 42 percent of budget revenues.[44] The state's contract procurement system did not match the demand of consumers with new yuan to spend, and the government accumulated expensive Western-style surpluses. Producer prices and quotas were consequently reduced for many items in 1985, and retail prices were increased.

Chinese economic reforms in industry also have been evolutionary. Starting with a pilot project in Sichuan Province, they spread by the end of 1981 to 80 percent of all state-owned enterprises. Their principal element is profit-sharing. Industries are allowed to keep shares of profits for capital investment, social funds, worker bonuses and the like.[45] After meeting state-set quotas, enterprises can sell extra production in the marketplace, provided they charge no more than 20 percent above state prices. Bank financing is beginning to replace budget allocations for plant expansions and upgrading. National government funding of capital investment, in fact, has fallen from 62 percent in 1978 to 36 percent in 1983. The ultimate goal, as defined by the most recent Chinese five-year plan, is for all industries to be completely responsible for their profits and losses by 1990. State-owned industries have sold "shares," which are more like bonds because they pay a guaranteed rate, but which may evolve toward industrial privatization. The recent bankruptcy of a small firm reinforces this possibility.[46]

The Chinese industrial sector still contains aspects of centralized, mandatory planning, especially in priority areas. Energy, particularly coal-fired electric power, is afforded priority investment and materials allocations. Recent events suggest that the industrial reforms are unacceptable to the Maoist cadres who still feel that industry must be controlled by the central government for socialism to survive in China. One observer in mid-1986 described the reforms in a "state of near deadlock," and noted that new layers of bureaucracy were usurping power from industrial directors. This situation was caused in part by budgetary deficits and foreign exchange shortages. But Premier Zhao Ziyang has announced the Party's continuing commitment to the reforms. Whether China will continue its "open door policy" will depend ultimately on who leads China.[47]

Other developing countries have been pushed by fiscal difficulties and mounting external debt to sell state-owned companies.[48] (See Table 8.) Brazil owns almost 500 companies, five times as many as in 1960. It intends to sell the smaller of these, and to sell shares of energy-related concerns which dominate the state-company budget. Shares of Petrobras, the national oil company, were already up for sale in 1985, though the main motivation may have been to avert the need to raise $400 million in taxes to pay for Petrobras' losses.[49] Brazil is not likely to relinquish control of the larger state-owned enterprises.

Brazil's new civilian government finds itself confronted not just with a foreign debt of $100 billion—debt service costs 5 percent of gross domestic product (GDP)—but with an entrenched economic bureaucracy. The World Bank estimates that the government itself allocates resources to or controls enterprises producing 40 to 46 percent of GDP. This fact, according to one Bank study, "[suggests] that governmental decisions have, to a considerable extent, replaced the price mechanism in determining the composition of investment and, hence, the emerging structure of productive capacity."[50]

Brazil wants to divest itself of money-losing enterprises, which account for 65 percent of the nation's $100 billion external debt. But sufficient local capital may not exist to buy them. Nationalistic, antiforeign-ownership attitudes have dominated Brazilian political economics for decades, so sales to foreigners are not likely. Thus, despite Brazil's willingness to privatize, difficulties have forced the government to exercise even tighter control, most notably the 1986 freeze on all wages and prices.[51]

Mexico outranks even Brazil in number of state-owned enterprises. The government reserves to itself oil, steel, chemicals, shipbuilding, and railroad industries. State ownership has concentrated debt and thus contributed to Mexico's crisis. The government has announced that it will sell 200 of its enterprises, partly to shed debt, and in 1985 sold some hotels and small industry.[52]

African nations, many of which imitated Maoist and Stalinist economic policies, have been slow to adopt reforms despite the pressure

Table 8: Industrial Economic Policy Trends in the 1980s, Selected Nations

Country	National-ization[a]	Reforms Announced	Trend in Market Orientation of Industry
Argentina	1946	Sell SOEs, 1986[1]	+
Bangladesh	1971	Sell SOEs, 1982	+
Brazil	1940s	Sell SOEs, 1983	+
China	1953	Permit POEs, 1983	+
Egypt	1961	—	0
East Germany	1945	SOE mergers, 1978	–
France	1981	Sell SOEs, 1986	+
Hungary	1949	Pricing, 1980s	+
India	1956	Deregulation, 1982, 1986	+
Indonesia	1957	Promote POEs, 1980s	+
Italy	—	Sell SOEs, 1983	+
Japan	—	Sell SOEs, 1985	+
Mexico	1950s	Sell SOEs, 1985	+
Nigeria	1960s	Sell SOEs, 1986	+
Pakistan	1972	Deregulation, 1979	+
Philippines	—	Sell SOEs, 1986	+
Poland	1960s	—	0
South Korea	—	Deregulation, 1986	+
Spain	1939	Sell SOEs, 1980s	+
Thailand	—	Sell SOEs, 1980s	+
Turkey	—	Sell SOEs, 1985	+
United Kingdom	1960s	Sell SOEs, 1979	+
United States	—	Deregulation, 1979	+
West Germany	—	Sell SOE shares, 1984	+
Yugoslavia	1945	Recentralization, 1986	–

[1]SOEs = State-owned enterprises; POEs = Privately owned enterprises.

[a]Includes both partial and total nationalizations of the industrial sector.

Source: Worldwatch Institute.

"Prices of food and oil are subsidized so heavily in Egypt that the expense amounts to 25 percent of the country's national budget."

of near collapse. Tanzania under President Julius Nyerere copied the Maoist model. Nyerere has retired, but Tanzania remains exceedingly poor and underdeveloped, yet wedded to the Chinese model that no longer exists. Nyerere's friend in revolution, President Robert Mugabe of Zimbabwe, has been determined not to repeat Tanzania's mistakes. Mugabe has retained market mechanisms while implementing specific measures to reduce inequity and underdevelopment. Most notably, he has provided incentives for farmers on tribal lands while permitting larger commercial farms to continue to operate. Programs to reduce infant mortality and to provide birth control measures have received high priority. Zimbabwe under Mugabe's rule is one of the few success stories on a troubled continent.[53]

Nigeria, Africa's most populous nation, and one outwardly committed to market mechanisms, staggers under serious economic difficulties. Examples of Nigerian economic mismanagement are not hard to find: inflated exchange rates that make imported rice and wheat cheaper than locally produced crops; purchase of expensive military equipment; and massive fraud in the Nigerian National Supply Company.[54] But the country has made some progress. The government will sell some state enterprises if it can, and has moved to end gasoline and diesel fuel subsidies. Divestiture of agricultural industries, hotels, breweries, and electrical machinery industries are planned. But the lack of skilled government makes the prospect of liberalization seem bleak in Nigeria.

Egypt, the other giant of Africa, is also headed for trouble. With a population approaching 50 million and an economy riddled with subsidies and inefficiencies, the country must import massive amounts of almost everything to support itself. Prices of food and oil are both controlled and subsidized so heavily by the state that the expense amounts to 25 percent of the country's national budget. State-owned enterprises have dominated the industrial sector of the Egyptian economy since 1961, when the means of production were nationalized. Almost 20 percent of GDP goes for public investment. Public enterprises are expected to serve social goals in the process of producing goods, particularly to absorb labor. They are virtually powerless to fire unproductive workers.[55]

Throughout Africa, agriculture remains underdeveloped and low in productivity, a situation for which some governments bear direct responsibility. The Organization of African Unity heads of state met in 1985 and adopted a measure recommending allocation of at least 20 percent of total investment to agriculture. The "Priority Programme" also calls on nations to provide necessary incentives for farmers, including price incentives.[56]

Manufacturing accounts for only 11 percent of African economic output, and progress remains slow. The African Development Bank associates industrial lethargy with nonmarket control. But it notes that markets are becoming more important in Africa's economies. A recent report concludes that "it would seem that the overall direction of change is towards more market freedom, more emphasis on producer incentives, increased resource allocation to agriculture, and the reform of the public sector to ensure greater profitability."[57]

The African Development Bank cites Ghana, Mali, Zaire, and Zambia as examples of nations that have begun the difficult reforms. Ghana has devalued its currency, freed up prices, and removed subsidies, especially for petroleum products. Mali has privatized many of its state-owned enterprises. Zambia has devalued its currency by 60 percent.[58]

South Asia suffers neither from Latin America's debt nor Africa's famine, but is experimenting with economic change because its economies, too, remain seriously underdeveloped. India has led the way in reform but Pakistan and Bangladesh have also made changes. India had in 1956 formally restricted to state enterprises the rail, air, communications, power, insurance, heavy extractive, and defense industries.[59] These industries were given additional flexibility in 1982 when a dual-price policy—one for delivery of government quotas, one for the open market—was implemented. Described as a radical change, it was designed to help overcome the shortages that have stymied the economy since the sixties. The cement industry has shown the first positive results. In the early eighties, for the first time, it overfilled its production plan. The increase in cement production from 1980 to 1985, in fact, equalled that of the preceding 25 years.

Indian agriculture has also been liberalized, with government mainly providing price guarantees that have generally been unnecessary, as they have been set below acceptable market prices.[60]

India has opened the door to more foreign investment. Prime Minister Rajiv Gandhi has been credited with having "prompted a flood of innovative technologies and styles of management, mostly from Japan, which are radically reshaping the indigenous industry."[61] Nevertheless, a trade deficit has been attributed to the liberalization, and India is having second thoughts about it.

Despite the Indian Constitution, which endorses socialist development, pressure is growing for a larger role for the market, especially for the privatization of money-making public enterprises. Private factories account for four-fifths of all plant facilities, but the state owns at least half of the value of industrial capital. Whether this figure will grow probably depends on Gandhi's success in controlling inflation and budget and trade deficits. It also depends on whether public enterprises squeeze out private investment as a consequence of competition for funds.

India still gives preference to state industry, however. "Priority," or state-owned, industries receive loans at 12.5 percent annual interest versus 18.5 percent for the private sector. Public enterprises may also float bonds exempt from wealth and capital gains taxes. Price preferences for public enterprises reach 10 to 20 percent.[62] Thus, India may be setting up its experiment with market reform to fail.

Western nations, meanwhile, are becoming more market-oriented in industrial policy. Japan, France, and West Germany have all begun to sell state-owned enterprises and their shares in companies. Western Europe in particular has been forced by large budgetary deficits to denationalize industry.

The United Kingdom under Prime Minister Margaret Thatcher created much of the interest in privatization. Since 1979, the United Kingdom has sold $6 billion worth of government-owned businesses in telecommunications, aerospace engineering, freight transportation, oil, hotels, and automobile manufacturing. Earnings in each

firm have increased. The British goal for privatization is to transfer 600,000 jobs to the private sector by the next election; since 1979 they have privatized 400,000. After privatization plans are complete, the share of total economic output produced by state-owned firms in Britain will have declined from 11 percent to 6.5 percent. Thatcher also wants to privatize social services, beginning with housing and care for elderly and poor: They would contract out care. This policy has met with increasing opposition.[63]

The United States, at least in terms of ownership of the means of production, remains the most market-oriented major economic power in the world. With only a small percentage of GNP generated by state companies and some private defense contractors that are virtually government appendages, the country has moved further to reduce government's role in the economy. It recently closed down the mammoth Synthetic Fuels Corporation, for example, which the Carter Administration created to subsidize production of oil substitutes. The most important market reorientation, however, came when President Carter deregulated petroleum prices. He also set in motion other important efforts at deregulation, particularly in trucking and air transportation.

Some observers have wondered whether the United States would converge with the Soviet Union in centralized planning because of the tendency for economic control to become increasingly concentrated in a few large corporations. This trend has slowed over the recent decade, but as a result of international trade that brought competition from foreign firms, not because of domestic competition. Four U.S. automakers build 99 percent of U.S.-made cars, but imports now represent about 30 percent of all new car sales. Steel-product imports have increased similarly, from 13 percent in 1972 to 22 percent in 1982. Steel manufacturers also face increasing competition from mini-mills, smaller-scale processors who rely on lower-cost electric-arc furnaces. The most dynamic part of the economy overall has been in small businesses where virtually all of the new jobs have been created over the last decade.[64]

Yet governments worldwide have resisted market reforms for agriculture. Western nations continue to subsidize farm production, and

distortion of agricultural prices everywhere in the West has become extreme. Rice is heavily protected and subsidized in Japan. Western Europe and the United States also maintain policies that create large distortions. (See Table 9.) These programs will cost the U.S. government at least $30 billion in 1986.[65]

Elsewhere, governments hobble agriculture, but with under- rather than over-payment. The Soviet Union, which under Stalin gave farm-

Table 9: Agricultural Producer Prices, Selected Countries, Compared with World Market Price, circa 1982

Country	Rice	Wheat
	(world price = 100)	
Japan	330	380
South Korea	210	220
Turkey	190	120
Kenya	165	145
European Common Market	140	125
United States	130	115
Bangladesh	85	75
India	80	100
Philippines	80	na
Pakistan	75	85
Thailand	75	na
Brazil	65	na
Tanzania	50	na
Egypt	45	95
Yugoslavia	na	55

Source: World Bank, *World Development Report 1986* (New York: Oxford University Press, 1986); Hans Binswanger and P. L. Scandizzo, "Patterns of Agricultural Protection," World Bank, Washington, D.C., November 15, 1983; World Bank, *Commodity Trade and Price Trends* (Baltimore: Johns Hopkins University Press, 1985).

ers prices equal to only about one-eighth of the value of their products, continues to underpay them. The global imbalance in agricultural policy reached a new height in 1986 when the United States agreed to export part of a wheat surplus—created by subsidies—to fill a Soviet wheat deficit—created by central planning.[66]

Worldwide, market reorientation through the mid-eighties has left the environmentally important natural resource industries almost untouched. Though private companies still control oil production in Australia, Britain, Canada, West Germany, and the United States, governments control oil supplies in Brazil, Mexico, Nigeria, Saudi Arabia, the Soviet Union, and Venezuela.[67]

Over half of all coal, perhaps the most noxious fuel, is produced or consumed by government plan. The largest state producers are China and the Soviet Union, which together produce and consume over one-third of the world's coal. Many major market-oriented nations own their coal-producing enterprises, including 100 percent of the coal industry in France, India, and the United Kingdom and half of that in West Germany.[68]

At least half of all steel, and its environmental burden, is produced by governments. The Soviet Union and Eastern Europe produce almost one-third of all steel. The governments of Brazil, France, India, Italy, Mexico, South Korea, and the United Kingdom own at least three-quarters of their steel-producing capacity, and those of Belgium and Spain own half of theirs. Of the major steel-producing countries, only Australia, Canada, West Germany, Japan, and the United States are almost completely private.[69]

Government control of the production and prices of oil, coal, and steel has led to excessive consumption of these resources. Some governments, however, have usefully intervened to conserve these resources. By adding taxes to the price of fuels, for example, to account for the environmental, security, and intergenerational costs of energy consumption, they have reduced these impacts. Many nations now apply taxes to oil products that drive their prices far above the U.S. retail price, which is largely unaffected by controls or taxes. (See Table 10.)

Table 10: Relative Fuel Oil and Gasoline Prices in Capitals of Selected Countries, January 1985

Country	Distillate Fuel Oil	Regular Leaded Gasoline
	(US = 100)[1]	
Yugoslavia	186	177
Japan	162	233[c]
France	162	206[a]
Sweden	157	173
Italy	156	229
Philippines[a]	153	159
Spain	140	178
Ethiopia	134	206
West Germany	131	150
Turkey	120	137
Thailand	115	142
Indonesia	103	128
United States	100	100
Hungary[b]	87	198
Brazil	76	181
Mexico	73	101
Argentina	72	169
Pakistan[a]	65	165
Soviet Union[b]	31	29
Venezuela	17	38

[1]Where 100 = $1.06/gallon for gasoline in 1985.

[a]Data are for July 1984.
[b]Estimated.
[c]Data are for January 1983.

Source: Energy Information Administration, U.S. Department of Energy, *International Energy Annual 1984* (Washington, D.C.: 1985).

A global tension grows as leaders ponder where to take their economies. The bold reforms of the Chinese have caught the Third World's attention, but for lack of political skill or courage, its leaders have taken only a few steps down that path. The future of the Chinese reforms themselves is not assured, because the Chinese system of government does not provide for systematic succession of power. They may last only as long as the current leadership. The Soviet Union and Eastern Europe, with the exception of Hungary, remain firmly committed to central control.

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In summary, there has been a dramatic shift in the structure of national economies: The century-long trend toward greater government control has ended. This shift has not involved the essential macroeconomic measures that balance and stabilize economic systems, but rather the details of production and allocation of resources. To the contrary, government intervention for enhancing the environmental sustainability of nations is growing, and possibly not quickly enough. But many nations, having drawn the boundaries of sustainability, are increasingly leaving the internal workings of economies to market mechanisms. Those that have—notably China, Hungary, and Zimbabwe—are reaping the rewards. Those that have not—Mexico, Nigeria, and Egypt—are headed for trouble. Nations falling between these extremes—India and Pakistan—are making slow progress toward greater economic and environmental efficiency.

Governments controlling the fates of over half the world's people stand at a crossroads that will take them either to greater or lesser market reliance. If they choose the Chinese path, they will probably reap the rewards of higher incomes, greater resource-use efficiency, and the chance to correct environmental problems. If they choose to retain centralized decision-making, they will probably bog down in the stagnation and inefficiency that have driven them to face the choice in the first place, and they will not likely find ways of controlling economic impacts on the environment.

The debt crisis, underdevelopment, and budget deficits meanwhile continue to take their toll. They make economic change necessary in each of the world's regions. And as Japan, because of its strong market orientation, is now considered part of the West, economic

decisions in the coming years may rearrange regional economic geography, or even alter the world's political polarity.

Conclusion

The world of the late eighties faces a growing rift in incomes and resource-use efficiency. Agricultural productivity has fallen in virtually every centrally planned nation over the last 20 years. Farm productivity continues to increase in market-oriented nations. Energy consumption per unit of output is highest in centrally planned economies. Fuel consumption per unit of output continues to rise in the Soviet Union while it is decreasing in Western Europe, Japan, and the United States. Acid rain emissions are being reduced in market economies, but continue to grow in centrally planned ones. Greater productive efficiency in market nations has reduced environmental pressures while inefficiency in centrally planned countries has increased them.

Income distribution is comparable in both types of economies, but market economies enjoy higher life expectancy and lower infant mortality, indicators which suggest greater overall well-being. Absolute income levels are much higher in market-oriented economies.

The growing disparity in incomes and resource-use efficiency may affect that most onerous of world problems, the balance of power between East and West, for the Third World nations may be drawn by necessity to more open, market-oriented solutions to their economic problems.

A given level of industrial production—a given level of wealth—can be created more efficiently under market conditions than otherwise. This fact derives from at least two advantages that markets have over central planning. The first is that they are largely self-administering. The price mechanism brings demand more or less automatically into equilibrium with supply. The second advantage is that the prices are meaningful. That is, under competition they reflect real scarcity values; values based both on the difficulty of winning new resources

from the earth and on the relative priorities that consumers place on them. Higher prices alert resource consumers to the cost of overconsumption; they transmit critical information between the environment and the economy. Central planners, if they did their jobs well, would replicate these functions of the market. But the difficulty of assembling the mountain of information required, coupled with the problem of competing priorities of resource conservation and political stability, hinders their ability to set meaningful prices and to allocate resources efficiently.

Beyond a point, the creation of wealth by market economies brings new problems, characterized by the prodigious consumption of gasoline in the West. This contradiction between efficiency and high per capita consumption highlights the role of sustainable economic policy. A boundary—a limit on consumption of some resources—can avert threats to sustainable development. Limitations on fishermen can ensure that the supply of fish is not depleted faster than it can be replenished. Similar measures can be implemented to protect other nonrenewable resources. When constraints are needed, they work best when applied at the macroeconomic level. Gasoline, for example, would not be rationed on an individual basis, but would be taxed to limit total consumption. Price mechanisms would then allocate the fuel to its most productive uses. Equity problems may follow, but nations can manage these through income policies, without resorting to rationing or planned allocation of resources.

Recent history suggests that economies worldwide might benefit from finding some common new path. This new path would veer away from central planning toward market reliance for microeconomic decisions. It would not, however, deny the necessity of government intervention at the macroeconomic level to keep economies in balance and to control external costs. It would not deny the necessity for societies to act as a whole through their political processes to improve their lot beyond the capabilities of market economies.

Many market-oriented nations have in fact begun to correct the market's failure to control external environmental costs. They draw the boundaries of sustainability by regulating environmental problems on an ad hoc basis. Applying scientific knowledge tempered by po-

litical judgment, they establish conservation criteria which the economic system must meet, criteria such as sulfur dioxide emissions controls or taxes on oil products.

Problem-solving in government depends on the free flow of information, freedom to lobby for legislation, the removal of unresponsive politicians from office, and the use of a judicial system to enforce laws. To economists and environmentalists experienced in legislative and legal battles with government as well as private corporations, it is difficult to conceive of change occurring without dissent, conflict, and a means for peacefully resolving conflict. Nevertheless, markets can operate in nations where governments own the means of production. Private ownership alone does not guarantee that markets will work.

In the mid-eighties, many countries have begun to reorient their economies. Seventeen of the world's 20 most populous nations are initiating measures to privatize state-owned industry, relax price controls, or increase competition. This reorientation affects two-thirds of the world's people. The prospect of the Third World abandoning centralized development then raises the possibility that the political polarity of the globe will be altered. As Romanian sociologist Silviu Brucan has noted, if the Soviets lose influence in the Third World to the Chinese—or Japanese, or Americans—they may be compelled to do what is strongly resisted by vested interests at home: reform their own economic system. Brucan argues that enough people are comfortable and well-served by the status quo in the Soviet Union that overcoming obstacles to reform will prove impossible without outside pressure. Loss of influence could provide that pressure.[70]

However, János Kornai cautions against over-optimism in economic affairs. He directs this advice particularly to American readers, writing, "There are unsolvable dilemmas, because each of us has conflicting goals and adheres to conflicting ethical postulates."[71] He is aware that "hard budgets" are more efficient, but efficiency means unemployment, and nations like Hungary may not have the resources to redistribute income quickly enough to reduce the human suffering that comes with economic readjustment. At the same time, Hungary and other socialist countries do not have the resources to continue the enormous inefficiency of central planning and soft

budgets. Western countries have generated enormous wealth, but to the extent that they fail to address the problems of underemployment, unemployment, and hunger amidst plenty, they undermine the credibility of market solutions.

One strong attraction of market policies is that they provide a countervailing power to governments. Successful government, as James Madison wrote in *The Federalist*, requires that "ambition be made to counteract ambition." That is, checks and balances are necessary to avoid not just political excesses, but the economic crises of central control. Conversely, governments must counteract the power of market monopolies and correct market failures. Markets are not perfect, but they may provide an essential check on absolute power.

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